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PUBLIC HEALTH REPORTS.

UNITED STATES.

[Reports to the Surgeon-General United States Marine-Hospital Service.]

Experiments with sulphur dioxide (5 per cent) for exposures less than twelve hours.

SAN FRANCISCO QUARANTINE STATION,
Angel Island, Cal., November 30, 1901.

SIR: I have the honor to transmit herewith a report of Acting Asst. Surg. S. A. Ransom relative to a series of experiments that were undertaken at this station with a view of determining whether the period of time could be shortened in the disinfection of vessels by sulphur dioxide.

The experiments, as the report shows, were made with care and thoroughness, and point to the conclusion that the time of exposure necessary to sterilize by means of sulphur dioxide can be shortened for all vessels to twelve hours exposure with almost perfect safety. This gain of twelve hours for iron vessels and thirty-six hours for wooden vessels would greatly facilitate their passage through quarantine, and incidentally be considerable of a gain in a commercial sense.

It is worthy of note that in experiment No. 5 all of the insects and all of the organisms, except the bacillus subtilus, were killed and the rat survived, although the conditions were such as to make rather an imperfect exposure. As insects are now supposed to be one of the principal factors in the dissemination of contagious diseases, that they are so readily killed by exposure to sulphur dioxide for a few hours, should inspire new confidence in this gas as a reliable insecticide.

Respectfully,
D. A. CARMICHAEL,
Surgeon, U. S. M. H. S.

[Inclosures.]

SAN FRANCISCO QUARANTINE STATION,
Angel Island, Cal., November 27, 1901.

SIR: I have the honor to submit herewith for your consideration certain data concerning experiments conducted under your supervision with a view of ascertaining the efficacy of sulphur dioxide fumigation in exposures of less than twelve hours, under conditions obtaining in actual practice.

In all, 6 experiments were made. In Nos. 1, 2, 3, and 4, the gas was rapidly evolved by the use of one of the furnaces installed on the hulk *Omaha;* in the remaining two, Nos. 5 and 6, it was produced by the pot method.

In experiments 1 to 4, inclusive, the conditions under which the work was done were practically identical, with the exception that in No. 1 dry gas was used, while in the following three, live steam, at a very low pressure, was introduced at the same time. No rats or insects were employed in experiments Nos. 3 and 4.

The following methods were pursued in the first four experiments:

The forward hold of the *Omaha*, containing 9,792 cubic feet, was the place selected in which to carry on the work, and for this space 49 pounds of roll sulphur were burned in the furnace and the gas was introduced through a 6-inch hose by means of the fan, thus giving approximately 5 per cent per volume strength. The exposure in

Nos. 1, 2, and 4 was six hours from the time all the gas was in, or seven hours altogether. In No. 3 the exposure was one hour longer. In No. 1, 6 common gray rats, together with flies, roaches, fleas, and ants were subjected to the sulphur fumes. Three of the rats were in a cage suspended near the top of the compartment, while the remainder were placed at the bottom in a box specially constructed to simulate as closely as possible the conditions under which these animals live aboard ship. This box was divided into 3 spaces, each containing a little more than a cubic foot, and having tight-fitting covers. At one end was an opening 6 inches square, covered with wire gauze; at the other a 3-inch circular apperture was provided. The middle compartment communicated with the outside only through the end spaces, through 2 holes, each 1½ inches square. Each division was filled with straw.

The insects were contained in wire gauze cages suspended at different heights in the hold.

In each experiment the bacillus subtilus, bacillus pestis, bacillus typhosis, bacillus pyocyaneus, and staphylococcus pyogenes aureus were submitted to the action of the gas in the following manner:

Four pieces of sterile absorbent gauze about 1 cm. wide and 3 cm. long were placed in separate sterile Petri dishes, and inoculated by means of a sterile pipette with 2 drops of a pure bouillon culture of one of the organisms. One such dish with top removed was securely wrapped in 2 thicknesses of sterile blanket, one in 2 thicknesses of sterile sheet, the third was exposed without protection, while the remaining one was covered and placed aside as a control. A few drops of the same culture were incorporated with a quantity of sterile garden earth, spread about 1 cm. thick in a Petri dish and thus exposed. The preparations were distributed to different parts of the hold. Upon the expiration of the specified time the animals, insects, and organisms were immediately removed from the influence of the gas, and the latter, together with the controls, planted in tubes of sterile bouillon.

In experiments Nos. 5 and 6, as before stated, the gas was evolved by burning roll sulphur in the ordinary way in an iron pot surrounded with water. In No. 5, 1 of the isolation cabins containing 1,417 cubic feet of space was employed for making the exposure, and in No. 6, 1 of the steam-disinfecting chambers of 1,500 cubic feet capacity was utilized. The entire time of exposure in each case was seven hours and 5 per cent of gas was used. The cabin permitted the escape of the major part of the gas, there being but a faint odor of sulphur perceptible when it was opened, while, on the other hand, fully fifteen minutes elapsed before it was possible to approach the chamber after opening it.

In No. 5 all of the organisms previously enumerated were used and in the same manner. Flies, spiders, and moths were also exposed. In this and the following experiment, No. 6, but 1 rat each was used, it being placed in the middle compartment (the most difficult of access) of the box. In No. 6 only 3 organisms were employed, viz. the bacilli of plague, typhoid fever, and the hay bacillus.

The bacillus subtilus was selected for these experiments as a representative of the spore-bearing organisms, and the others, especially plague and typhoid fever, because they were types which may be frequently encountered in actual disinfection. The cultures used varied in age from twenty-four hours to ten days.

The last 5 experiments were fatal to all of the planted organisms except the bacillus subtilus.

All controls grew promptly.

It will be noticed, upon reference to the accompanying table, that some contaminations occurred in the bacteriological work. In experiment No. 2 these could be accounted for by the falling of a hatch cover into the hold, stirring up a quantity of dust, after the preparations were in place.

Insects were destroyed whenever used, which statement applies also to rats, except in No. 5 where the animal survived, apparently none the worse for his experience.

I am very much indebted to Dr. Walker for the assistance which she has rendered me throughout this work.

Respectfully,

S. A. Ransom,
Acting Assistant Surgeon, U. S. M. H. S.

D. A. Carmichael,
Surgeon, U. S. M. H. S.

Table showing result of experiments with sulphur dioxide (5 per cent) for six hours' exposure.

Explanations: — indicates animals or organisms killed, + indicates their survival, C indicates contaminations.

	Rats.	Insects.	Subtilus.					Plague.					Typhoid.					Pyocyaneus.					Pyogenes aureus.				
			Open.	In earth.	In blanket.	In sheet.	Control.	Open.	In earth.	In blanket.	In sheet.	Control.	Open.	In earth.	In blanket.	In sheet.	Control.	Open.	In earth.	In blanket.	In sheet.	Control.	Open.	In earth.	In blanket.	In sheet.	Control.
Experiment—																											
No. 1	—	—	+	+	+	+	+	C	—	+	...	+	—	—	—	—	+	C	—	+	+	+	—	—	+	+	+
No. 2	—	—	C	+	+	+	+	—	—	—	—	+	—	C	C	C	+	C	C	—	—	+	C	—	C	—	+
No. 3	...	...	—	+	+	+	+	—	—	—	—	+	—	—	—	—	+	—	—	—	—	+	—	—	—	—	+
No. 4	...	...	—	+	+	+	+	C	—	—	—	+	—	—	—	—	+	—	—	—	—	+	—	—	—	—	+
No. 5	+	—	+	+	+	+	+	—	—	—	—	+	—	—	—	—	+	—	—	—	—	+	C	C	—	—	+
No. 6	—	...	—	+	+	+	+	—	—	—	—	+	—	—	—	—	+	...	...	...	...	...	...	...	...	...	...

Smallpox at Shreveport, La.

SHREVEPORT, LA., *December 16, 1901.*

SIR: I have the honor to inform you of the smallpox situation in this port and the surrounding country.

Everything is being done by the city officials possible to stamp it out. There are a number of infected points in the city, and the greatest difficulty in the way of handling it properly is in the concealment of cases by some of the colored people.

The parish authorities of Caddo and Bossieu have not done anything to date to suppress it, except to furnish vaccine virus. The reason of this neglect is due to the mild form of smallpox in the country the past eighteen months. It is now regarded by many as a trivial disease. I saw Dr. J. C. Egan, president of the Shreveport board of health (he is also a member of the Louisiana State board of health), about the matter to-day. He informs me he will mandamus the police juries of his district if they do not take action. He has authority to do so under State act 192 of 1898.

All cases to date are colored.

Any instructions you may give me in regard to the matter I will gladly execute.

Respectfully,
J. S. O'LEARY,
Acting Assistant Surgeon, U. S. M. H. S.

Amendment to the regulations against the spitting nuisance in Boston.

BOSTON, MASS., *July 11, 1901.*

SIR: At a meeting of the board of health this day, the regulation dated October 13, 1896, respecting the deposit of sputum in street cars and other public places, amended March 23, 1899, is hereby again amended so as to read as follows:

> The board of health hereby adjudges that the deposit of sputum in public places is a nuisance, source of filth, and cause of sickness, and hereby orders: That spitting upon the floor, platform, or steps of any railroad or railway station, or car, or from any electric car while said car is in the subway or elevated above the surface of the ground, or upon the floor, platform, or steps of any public building, hall, church, theater, market, or any sidewalk immediately connected with said public places, be, and hereby is, prohibited.

Respectfully,
C. E. DAVIS, Jr.,
Secretary.